



## Aitik tour: ABB technology stations



### 1. Motors and drive systems

ABB has delivered some 650 electric motors and motor-control devices (drives) for the new installations at Aitik. The motors range in power from 4 kilowatts to 3.36 megawatts and are used at almost every stage of the mining process. They drive the crushers in the mining pit, the conveyors carrying the crushed rock to the concentrator, the grinding mills, the pumps supplying water to the mills and removing the muddy waste left after the concentration process, as well as the fans regulating air quality.

Many of the motors used at Aitik are required to operate 24 hours a day, 365 days a year – like the mine itself – and are often in very dusty

environments. Any outdoor equipment at the site must be able to withstand temperatures that can drop as low as -35°C in the winter. These factors make reliability one of the most important requirements of the customer.

### Conveyor drives

There has been a significant increase in the number and size of overland conveyors in recent years, partly because of their lower environmental impact compared with other means of transport. The increase in size has created additional challenges, resulting in more demanding requirements for the mechanical devices and the power supply. Controlled soft starting and operation of the equipment, as well as its protection, have gained importance.



The selection of the drive solution for the conveyor has therefore become more critical. Besides traditional criteria such as performance, efficiency and capital costs, additional factors that need to be evaluated include:

- Flexibility and optimization of operation
- Reliability and aging of the conveyor equipment
- Fewer parts subject to wear and tear to increase intervals between maintenance
- Compact motor design and small installation area, especially for underground installations
- Motor design allowing easy and rapid change of pulleys and pulley bearings

ABB has developed technology specifically to meet overland conveyor requirements. ABB's Overland Conveyor (OLC) Drive Solutions, used throughout Aitik, provide OLC-specific functionality such as load sharing, soft start under all load conditions, various braking and stop functions, and more.

### 2. Substation and harmonic filter

Mining is an energy-intensive activity, and the Aitik expansion project has required the construction of an additional power line to the site. A new, higher-capacity substation was also required to manage the additional incoming power.

ABB has delivered a 170 kilovolt (kV) substation based on gas-insulated switchgear technology. By placing the switchgear in a metal casing and insulating the equipment with an inert gas, the size of the



installation has been reduced to about one-fifth of the size of a traditional air-insulated substation.

The substation has two incoming power lines from the utility, ensuring deliveries of electricity even if one line fails. Three 80 MVA (megavolt ampere) transformers lower the voltage of the incoming power for use in the mine. The power handled by the transformers is equivalent to the requirements of a city of about 100,000 people.

The electricity is distributed in the mine through 24 kV switchgear from ABB's UniGear family of equipment.

The substation and the two power lines are monitored and protected by a relay protection system of the Relion® family. As the mine is required to operate night and day, the power equipment ensures the highest possible reliability of the power supply.

ABB has also supplied a harmonic filter system, located next to the substation. This enables Boliden to avoid damage to its own equipment as well as disturbance to the local power supply that could lead to fines from the utility.



### 3. Gearless mill drives

Mill drives are a critical component in ore and mineral processing. They combine huge capacity and brute strength with energy-efficient operation to grind the ore into smaller pieces for further processing.

Gearless mill drives (GMDs) are the largest variety, and the absence of a gearbox and other mechanical components increases their efficiency while reducing the need for maintenance.



The main component of a GMD is a colossal motor integrated into a drum-like mill in which mineral ore is ground. The motor is equipped with a drive, which starts the mill smoothly without any mechanical stress. The GMDs at Aitik have a rating of 22.5 MW, making them the world's most powerful in operation today. The mills they power are 13.7 meters long and 11.6 meters in diameter, which also makes them the world's largest by volume, and each has a grinding capacity of 2,200 tons of ore per hour.

Size is directly related to productivity. The larger the mill, the more ore it can grind. But with greater capacity comes increased power consumption and greater risk of disturbing the power distribution network. ABB gearless mill

drives provide the huge capacity needed while keeping energy consumption low and without reducing power quality.

Energy consumed in grinding can be 50-70 percent of the total energy used to recover ore. Drives are an energy-efficient way to match mill speed to the needs of the grinding process. With no moving parts



between the motor and the drum, a gearless mill is also extremely strong and can reliably process vast quantities of ore.

ABB delivered the world's first GMD to a Lafarge cement mill in 1969 (it is still in operation) and has a market share of more than 50 percent.

#### 4. Control system

Equipment in a process plant must be controlled and monitored in a coordinated manner despite its geographical distribution throughout the plant. Sensors and controllers are used around the plant to detect and communicate process information, providing opportunities for a rapid response that will maintain productivity. This type of management system is known as a distributed control system (DCS).



The entire site process at Aitik – including the concentrator plant, conveyor systems, pumping stations and even the mine's own sewage plant – is controlled by ABB's Extended Automation System 800xA. This is more than a DCS: It is a platform by which to integrate a diverse assortment of equipment, systems and applications to provide a common visual interface.

At Aitik, System 800xA is integrated with the mine's IBM Maximo maintenance system and with its document management system, enabling Boliden to monitor

equipment in such a way that it can predict when maintenance is required. It is the world's first installation to combine all these elements, and the benefits for the customer will be fewer interruptions and a more efficient maintenance process.

Aitik is also one of the first industrial sites in the world to use the new international standard that defines communication within and between electrical components, known as IEC 61850. This means that the System 800xA at Aitik provides a single environment by which to control and supervise process automation equipment, power automation equipment, as well as protection, switchgear, transmission and distribution equipment.

The integration of the electrical control system into the process control system at the plant increases productivity and reduces stoppages by permitting a single strategy in the areas of engineering, maintenance and operations. Furthermore, the adoption of a global standard based on the latest technology enables lower installation and operational costs, as well as enhanced visibility of the power usage and consumption.

A reliable and dependable energy supply is vital for the functioning of any industry. Managing and controlling this supply is thus as important as managing and controlling any other significant process parameter.